IN THE CLAIMS

1. (previously presented) A method for imaging an object with a computed tomographic (CT) imaging system, comprising the steps of:

helically scanning the object with a multi-slice CT imaging system to acquire attenuation measurements of the object, the measurements including more than two conjugate samples, wherein a difference between a view angle of one of the more than two conjugate samples and a view angle of any one of the remaining conjugate samples of the more than two conjugate samples is $n\pi$, wherein n is an integer greater than zero;

estimating at least one projection along a curved plane of reconstruction of the object using the attenuation measurements of the object, including the more than two conjugate samples; and

filtering and backprojecting the attenuation measurements of the object, including the more than two conjugate samples, to reconstruct at least one image slice of the object.

2. (previously presented) A method in accordance with Claim 1 wherein the more than two conjugate samples are located within a predetermined distance from the curved plane of reconstruction of the object.

3. (original) A method in accordance with Claim 1 wherein the CT imaging system has N detector rows, and further comprising the step of selecting a helical pitch P:1 for said helical scan, where P is a non-integer less than N.

4 (original) A method in accordance with Claim 3 wherein N=4 and P=2.5.

5. (original) A method in accordance with Claim 1 further comprising the step of applying a non-linear interpolation to the attenuation measurements prior to said filtering and backprojecting.

6. (original) A method in accordance with Claim 5 wherein applying a non-linear interpolation to the attenuation measurements comprises applying a Lagrange interpolation to the attenuation measurements.

7. (original) A method in accordance with Claim 6 wherein applying a Lagrange interpolation to the attenuation measurements comprises applying third order Lagrange interpolation weights to measurements from four detector rows.

8 (previously presented) A method in accordance with Claim 5 wherein the CT imaging system has 4 detector rows, helically scanning the object to obtain attenuation measurements comprises the step of helically scanning the object at a pitch of 2.5:1, and said estimating at least one projection along the curved plane of reconstruction comprises the step of estimating projections along the curved plane of reconstruction written as $\beta_1' = 2.8\pi - \gamma, \beta_2' = 2\pi - \gamma, \beta_3' = 1.2\pi - \gamma,$ and $\beta_4' = 0.4\pi - \gamma$, where $\beta_1', \beta_2', \beta_3',$ and β_4' represent view angles in a curved plane for corresponding detector rows R1, R2, R3, and R4, respectively, and γ represents a detector angle.

9. (original) A method in accordance with claim 5 wherein applying a non-linear interpolation to the attenuation measurements comprises combining weighted interpolated measurements with weighted extrapolated measurements.

10. (original) A method in accordance with Claim 9 wherein the CT imaging system has 4 detector rows R1, R2, R3, and R4, helically scanning the object to obtain attenuation measurements comprises the step of helically scanning the object at a pitch of 2.5:1, and said

method further comprises the step of applying weights to attenuation measurements for detector rows R1, R2, R3, and R4 respectively, wherein the applied weights are written as:

$w_1(\gamma,\beta) =$

$$\begin{cases} \left[\left(\frac{5\theta_1+2\pi}{2\pi}\right)^\alpha + \left(\frac{-5\theta_1}{2\pi}\right)^\alpha\right]\left(\frac{5\theta_1+2\pi}{2\pi}\right), & \beta_1' - \frac{2\pi}{5} \le \beta < \beta_1' - \frac{\pi}{5} \\ \left[1-\left(\frac{5\theta_1+2\pi}{2\pi}\right)^\alpha - \left(\frac{-5\theta_1}{2\pi}\right)^\alpha\right]\left(\frac{\pi-5\theta_1}{\pi}\right) + & \\ \quad \left[\left(\frac{5\theta_1+2\pi}{2\pi}\right)^\alpha + \left(\frac{-5\theta_1}{2\pi}\right)^\alpha\right]\left(\frac{5\theta_1+2\pi}{2\pi}\right), & \beta_1' - \frac{\pi}{5} \le \beta < \beta_1' \\ \left[\left(\frac{5\theta_1}{\pi}\right)^\alpha + \left(\frac{\pi-5\theta_1}{\pi}\right)^\alpha\right]\left(\frac{\pi-5\theta_1}{\pi}\right), & \beta_1' \le \beta < \beta_1' + \frac{\pi}{5} \end{cases}$$

where $\theta_1 = \beta - \beta_1' = \beta - 2.8\pi + \gamma$,

$$w_2(\gamma,\beta)=$$

$$\begin{cases}
\left[1-\left(\dfrac{5\theta_2+3\pi}{2\pi}\right)^{\alpha}-\left(\dfrac{-5\theta_2-\pi}{2\pi}\right)^{\alpha}\right]\left(\dfrac{5\theta_2+\pi}{\pi}\right), & \beta_2'-\dfrac{2\pi}{5}\le\beta<\beta_2'-\dfrac{\pi}{5} \\[2ex]
\left[1-\left(\dfrac{5\theta_2+\pi}{\pi}\right)^{\alpha}-\left(\dfrac{-5\theta_2}{\pi}\right)^{\alpha}\right]\left(\dfrac{\pi-5\theta_2}{\pi}\right)+ & \\
\quad\left[\left(\dfrac{5\theta_2+\pi}{\pi}\right)^{\alpha}+\left(\dfrac{-5\theta_2}{\pi}\right)^{\alpha}\right]\left(\dfrac{5\theta_2+\pi}{\pi}\right), & \beta_2'-\dfrac{\pi}{5}\le\beta<\beta_2' \\[2ex]
\left[\left(\dfrac{5\theta_2}{\pi}\right)^{\alpha}+\left(\dfrac{\pi-5\theta_2}{\pi}\right)^{\alpha}\right]\left(\dfrac{\pi-5\theta_2}{\pi}\right), & \beta_2'\le\beta<\beta_2'+\dfrac{\pi}{5} \\[2ex]
\left[1-\left(\dfrac{5\theta_2-\pi}{\pi}\right)^{\alpha}-\left(\dfrac{2\pi-5\theta_2}{\pi}\right)^{\alpha}\right]\left(\dfrac{\pi-5\theta_2}{\pi}\right), & \beta_2'+\dfrac{\pi}{5}\le\beta<\beta_2'+\dfrac{2\pi}{5}
\end{cases}$$

where $\theta_2=\beta-\beta_2'=\beta-2\pi+\gamma$,

$$
w_3(\gamma,\beta)=
\begin{cases}
\left[1-\left(\frac{5\theta_3+2\pi}{\pi}\right)^{\alpha}-\left(\frac{-5\theta_3-\pi}{\pi}\right)^{\alpha}\right]\left(\frac{5\theta_3+\pi}{\pi}\right) & \beta_3'-\frac{2\pi}{5}\le\beta<\beta_3'-\frac{\pi}{5}\\
\left[1-\left(\frac{5\theta_3+\pi}{\pi}\right)^{\alpha}-\left(\frac{-5\theta_3}{\pi}\right)^{\alpha}\right]\left(\frac{\pi-5\theta_3}{\pi}\right)+ & \\
\quad\left[\left(\frac{5\theta_3+\pi}{\pi}\right)^{\alpha}+\left(\frac{-5\theta_3}{\pi}\right)^{\alpha}\right]\left(\frac{5\theta_3+\pi}{\pi}\right) & \beta_3'-\frac{\pi}{5}\le\beta<\beta_3'\\
\left[1-\left(\frac{5\theta_3}{\pi}\right)^{\alpha}-\left(\frac{\pi-5\theta_3}{\pi}\right)^{\alpha}\right]\left(\frac{\pi+5\theta_3}{\pi}\right)+ & \\
\quad\left[\left(\frac{5\theta_3}{\pi}\right)^{\alpha}+\left(\frac{\pi-5\theta_3}{\pi}\right)^{\alpha}\right]\left(\frac{\pi-5\theta_3}{\pi}\right) & \beta_3'\le\beta<\beta_3'+\frac{\pi}{5}\\
\left[1-\left(\frac{5\theta_3-\pi}{2\pi}\right)^{\alpha}-\left(\frac{3\pi-5\theta_3}{2\pi}\right)^{\alpha}\right]\left(\frac{\pi-5\theta_3}{\pi}\right) & \beta_3'+\frac{\pi}{5}\le\beta<\beta_3'+\frac{2\pi}{5}
\end{cases}
$$

where $\theta_3=\beta-\beta_3'=\beta-1.2\pi+\gamma$, and

$$w_4(\gamma,\beta)=$$

$$\begin{cases}
\left[1-\left(\frac{5\theta_4+2\pi}{\pi}\right)^{\alpha}-\left(\frac{-5\theta_4-\pi}{\pi}\right)^{\alpha}\right]\left(\frac{5\theta_4+\pi}{\pi}\right) & \beta_4'-\frac{2\pi}{5}\le\beta<\beta_4'-\frac{\pi}{5} \\
\left[\left(\frac{5\theta_4+\pi}{\pi}\right)^{\alpha}+\left(\frac{-5\theta_4}{\pi}\right)^{\alpha}\right]\left(\frac{\pi+5\theta_4}{\pi}\right) & \beta_4'-\frac{\pi}{5}\le\beta<\beta_4' \\
\left[1-\left(\frac{5\theta_4}{2\pi}\right)^{\alpha}-\left(\frac{2\pi-5\theta_4}{2\pi}\right)^{\alpha}\right]\left(\frac{\pi+5\theta_4}{\pi}\right)+ & \\
\quad\left[\left(\frac{5\theta_4}{2\pi}\right)^{\alpha}+\left(\frac{2\pi-5\theta_4}{2\pi}\right)^{\alpha}\right]\left(\frac{2\pi-5\theta_4}{2\pi}\right) & \beta_4'\le\beta<\beta_4'+\frac{\pi}{5} \\
\left[\left(\frac{5\theta_4}{2\pi}\right)^{\alpha}+\left(\frac{2\pi-5\theta_4}{2\pi}\right)^{\alpha}\right]\left(\frac{2\pi-5\theta_4}{2\pi}\right) & \beta_4'+\frac{\pi}{5}\le\beta<\beta_4'+\frac{2\pi}{5}
\end{cases}$$

where $\theta_4=\beta-\beta_4'=\beta-0.4\pi+\gamma$,

$\beta_1'=2.8\pi-\gamma, \beta_2'=2\pi-\gamma, \beta_3'=1.2\pi-\gamma$, and $\beta_4'=0.4\pi-\gamma$;

$\beta_1', \beta_2', \beta_3'$, and β_4' represent view angles intersecting the POR for detector rows R1, R2, R3, and R4, respectively, and

γ represents a detector angle.

11. (original) A method in accordance with Claim 1 further comprising the step of applying a set of weights to the attenuation measurements prior to said filtering and backprojecting.

12. (original) A method in accordance with Claim 11 wherein applying a set of weights to the attenuation measurements comprises the step of applying Lagrange weights to the attenuation measurements.

13. (original) A method in accordance with Claim 12 wherein applying Lagrange weights to the attenuation measurements comprises applying third order Lagrange weights to measurements from four detector rows.

14. (previously presented) A method in accordance with Claim 11 wherein the CT imaging system has 4 detector rows, helically scanning the object to obtain attenuation measurements comprises the step of helically scanning the object at a pitch of 2.5:1, and said estimating at least one projection along the curved plane of reconstruction comprises the step of estimating projections along the curved plane of reconstruction written as $\beta_1' = 2.8\pi - \gamma, \beta_2' = 2\pi - \gamma, \beta_3' = 1.2\pi - \gamma,$ and $\beta_4' = 0.4\pi - \gamma$, where $\beta_1', \beta_2', \beta_3',$ and β_4' represent view angles in a curved plane for corresponding detector rows R1, R2, R3, and R4, respectively, and γ represents a detector angle.

15. (previously presented) A computed tomographic (CT) imaging system for imaging an object, said system comprising a radiation source and a multi-slice detector configured to acquire attenuation measurements of an object between said radiation source and said multi-slice detector, said system configured to:

helical scan the object to acquire attenuation measurements of the object, said measurements including more than two conjugate samples, wherein a difference between a view angle of one of the more than two conjugate samples and a view angle of any one of the remaining conjugate samples of the more than two conjugate samples is nπ, wherein n is an integer greater than zero;

estimate at least one projection along a curved plane of reconstruction of the object using the attenuation measurements of the object, including the more than two conjugate samples; and

filter and backproject the attenuation measurements of the object, including the more than two conjugate samples, to reconstruct at least one image slice of the object.

16. (previously presented) A system in accordance with Claim 15 further configured so that the more than two conjugate samples are located within a predetermined distance from the curved plane of reconstruction of the object.

17. (original) A system in accordance with Claim 16 having N detector rows, and further configured to perform the helical scan at a pitch P:1, where P is a non-integer less than N.

18. (original) A system in accordance with Claim 17 wherein N=4 and P=2.5.

19. (previously presented) A system in accordance with Claim 15 further configured to apply a non-linear interpolation to the attenuation measurements prior to said filtering and backprojecting.

20. (original) A system in accordance with Claim 19 wherein said system being configured to apply a non-linear interpolation to the attenuation measurements comprises said system being configured to apply a Lagrange interpolation to the attenuation measurements.

21. (original) A system in accordance with Claim 20 wherein said system being configured to apply a Lagrange interpolation to the attenuation measurements comprises said system being configured to apply third order Lagrange interpolation weights to measurements from four detector rows.

22. (previously presented) A system in accordance with Claim 19 having 4 detector rows, and wherein said system being configured to helically scan the object to obtain attenuation measurements comprises said system being configured to helically scan the object at a pitch of

2.5:1, and to estimate at least one projection along the curved plane of reconstruction said system is further configured to estimate projections along the curved plane of reconstruction written as $\beta_1' = 2.8\pi - \gamma$, $\beta_2' = 2\pi - \gamma$, $\beta_3' = 1.2\pi - \gamma$, and $\beta_4' = 0.4\pi - \gamma$, where β_1', β_2', β_3', and β_4' represent view angles in a curved plane for corresponding detector rows R1, R2, R3, and R4, respectively, and γ represents a detector angle.

23. (original) A system in accordance with claim 19 wherein said system being configured to apply a non-linear interpolation to the attenuation measurements comprises said system being configured to combine weighted interpolated measurements with weighted extrapolated measurements.

24. (original) A system in accordance with Claim 23 having 4 detector rows R1, R2, R3, and R4, wherein said system being configured to helically scan the object to obtain attenuation measurements comprises said system being configured to helically scan the object at a pitch of 2.5:1, and said system is further configured to apply weights to attenuation measurements for detector rows R1, R2, R3, and R4 respectively, wherein the applied weights are written as:

$w_1(\gamma, \beta) =$

$$\begin{cases} \left[\left(\frac{5\theta_1 + 2\pi}{2\pi}\right)^\alpha + \left(\frac{-5\theta_1}{2\pi}\right)^\alpha\right]\left(\frac{5\theta_1 + 2\pi}{2\pi}\right), & \beta_1' - \frac{2\pi}{5} \le \beta < \beta_1' - \frac{\pi}{5} \\ \left[1 - \left(\frac{5\theta_1 + 2\pi}{2\pi}\right)^\alpha - \left(\frac{-5\theta_1}{2\pi}\right)^\alpha\right]\left(\frac{\pi - 5\theta_1}{\pi}\right) + & \\ \quad \left[\left(\frac{5\theta_1 + 2\pi}{2\pi}\right)^\alpha + \left(\frac{-5\theta_1}{2\pi}\right)^\alpha\right]\left(\frac{5\theta_1 + 2\pi}{2\pi}\right), & \beta_1' - \frac{\pi}{5} \le \beta < \beta_1' \\ \left[\left(\frac{5\theta_1}{\pi}\right)^\alpha + \left(\frac{\pi - 5\theta_1}{\pi}\right)^\alpha\right]\left(\frac{\pi - 5\theta_1}{\pi}\right), & \beta_1' \le \beta < \beta_1' + \frac{\pi}{5} \end{cases}$$

where $\theta_1 = \beta - \beta_1' = \beta - 2.8\pi + \gamma$,

$$w_2(\gamma,\beta)=$$

$$\begin{cases}
\left[1-\left(\dfrac{5\theta_2+3\pi}{2\pi}\right)^{\alpha}-\left(\dfrac{-5\theta_2-\pi}{2\pi}\right)^{\alpha}\right]\left(\dfrac{5\theta_2+\pi}{\pi}\right), & \beta_2'-\dfrac{2\pi}{5}\le\beta<\beta_2'-\dfrac{\pi}{5} \\
\left[1-\left(\dfrac{5\theta_2+\pi}{\pi}\right)^{\alpha}-\left(\dfrac{-5\theta_2}{\pi}\right)^{\alpha}\right]\left(\dfrac{\pi-5\theta_2}{\pi}\right)+ & \\
\quad\left[\left(\dfrac{5\theta_2+\pi}{\pi}\right)^{\alpha}+\left(\dfrac{-5\theta_2}{\pi}\right)^{\alpha}\right]\left(\dfrac{5\theta_2+\pi}{\pi}\right), & \beta_2'-\dfrac{\pi}{5}\le\beta<\beta_2' \\
\left[\left(\dfrac{5\theta_2}{\pi}\right)^{\alpha}+\left(\dfrac{\pi-5\theta_2}{\pi}\right)^{\alpha}\right]\left(\dfrac{\pi-5\theta_2}{\pi}\right), & \beta_2'\le\beta<\beta_2'+\dfrac{\pi}{5} \\
\left[1-\left(\dfrac{5\theta_2-\pi}{\pi}\right)^{\alpha}-\left(\dfrac{2\pi-5\theta_2}{\pi}\right)^{\alpha}\right]\left(\dfrac{\pi-5\theta_2}{\pi}\right), & \beta_2'+\dfrac{\pi}{5}\le\beta<\beta_2'+\dfrac{2\pi}{5}
\end{cases}$$

where $\theta_2=\beta-\beta_2'=\beta-2\pi+\gamma$,

$$w_3(\gamma,\beta)=$$

$$\begin{cases}
\left[1-\left(\dfrac{5\theta_3+2\pi}{\pi}\right)^{\alpha}-\left(\dfrac{-5\theta_3-\pi}{\pi}\right)^{\alpha}\right]\left(\dfrac{5\theta_3+\pi}{\pi}\right) & \beta_3'-\dfrac{2\pi}{5}\le\beta<\beta_3'-\dfrac{\pi}{5} \\[2ex]
\left[1-\left(\dfrac{5\theta_3+\pi}{\pi}\right)^{\alpha}-\left(\dfrac{-5\theta_3}{\pi}\right)^{\alpha}\right]\left(\dfrac{\pi-5\theta_3}{\pi}\right)+ & \\
\quad\left[\left(\dfrac{5\theta_3+\pi}{\pi}\right)^{\alpha}+\left(\dfrac{-5\theta_3}{\pi}\right)^{\alpha}\right]\left(\dfrac{5\theta_3+\pi}{\pi}\right) & \beta_3'-\dfrac{\pi}{5}\le\beta<\beta_3' \\[2ex]
\left[1-\left(\dfrac{5\theta_3}{\pi}\right)^{\alpha}-\left(\dfrac{\pi-5\theta_3}{\pi}\right)^{\alpha}\right]\left(\dfrac{\pi+5\theta_3}{\pi}\right)+ & \\
\quad\left[\left(\dfrac{5\theta_3}{\pi}\right)^{\alpha}+\left(\dfrac{\pi-5\theta_3}{\pi}\right)^{\alpha}\right]\left(\dfrac{\pi-5\theta_3}{\pi}\right) & \beta_3'\le\beta<\beta_3'+\dfrac{\pi}{5} \\[2ex]
\left[1-\left(\dfrac{5\theta_3-\pi}{2\pi}\right)^{\alpha}-\left(\dfrac{3\pi-5\theta_3}{2\pi}\right)^{\alpha}\right]\left(\dfrac{\pi-5\theta_3}{\pi}\right) & \beta_3'+\dfrac{\pi}{5}\le\beta<\beta_3'+\dfrac{2\pi}{5}
\end{cases}$$

where $\theta_3=\beta-\beta_3'=\beta-1.2\pi+\gamma$, and

$$w_4(\gamma,\beta) = \begin{cases} \left[1-\left(\frac{5\theta_4+2\pi}{\pi}\right)^{\alpha}-\left(\frac{-5\theta_4-\pi}{\pi}\right)^{\alpha}\right]\left(\frac{5\theta_4+\pi}{\pi}\right) & \beta'_4-\frac{2\pi}{5}\le\beta<\beta'_4-\frac{\pi}{5} \\ \left[\left(\frac{5\theta_4+\pi}{\pi}\right)^{\alpha}+\left(\frac{-5\theta_4}{\pi}\right)^{\alpha}\right]\left(\frac{\pi+5\theta_4}{\pi}\right) & \beta'_4-\frac{\pi}{5}\le\beta<\beta'_4 \\ \left[1-\left(\frac{5\theta_4}{2\pi}\right)^{\alpha}-\left(\frac{2\pi-5\theta_4}{2\pi}\right)^{\alpha}\right]\left(\frac{\pi+5\theta_4}{\pi}\right)+ & \\ \quad\left[\left(\frac{5\theta_4}{2\pi}\right)^{\alpha}+\left(\frac{2\pi-5\theta_4}{2\pi}\right)^{\alpha}\right]\left(\frac{2\pi-5\theta_4}{2\pi}\right) & \beta'_4\le\beta<\beta'_4+\frac{\pi}{5} \\ \left[\left(\frac{5\theta_4}{2\pi}\right)^{\alpha}+\left(\frac{2\pi-5\theta_4}{2\pi}\right)^{\alpha}\right]\left(\frac{2\pi-5\theta_4}{2\pi}\right) & \beta'_4+\frac{\pi}{5}\le\beta<\beta'_4+\frac{2\pi}{5} \end{cases}$$

where $\theta_4 = \beta - \beta'_4 = \beta - 0.4\pi + \gamma$,

$\beta'_1 = 2.8\pi - \gamma, \beta'_2 = 2\pi - \gamma, \beta'_3 = 1.2\pi - \gamma$, and $\beta'_4 = 0.4\pi - \gamma$;

$\beta'_1, \beta'_2, \beta'_3$, and β'_4 represent view angles intersecting the POR for detector rows R1, R2, R3, and R4, respectively, and

γ represents a detector angle.

25. (original) A system in accordance with Claim 15 further configured to apply a set of weights to the attenuation measurements prior to said filtering and backprojecting.

26. (original) A system in accordance with Claim 25 wherein said system being configured to apply a set of weights to the attenuation measurements comprises said system being configured to apply Lagrange weights to the attenuation measurements.

27. (original) A system in accordance with Claim 26 wherein said system being configured to apply Lagrange weights to the attenuation measurements comprises said system being configured to apply third order Lagrange weights to measurements from four detector rows.

28. (previously presented) A system in accordance with Claim 15 having 4 detector rows, and said system being configured to helically scan the object to obtain attenuation measurements comprises said system being configured to helically scan the object at a pitch of 2.5:1, and to estimate at least one projection along the curved plane of reconstruction said system is further configured to estimate projections along the curved plane of reconstruction written as $\beta_1' = 2.8\pi - \gamma, \beta_2' = 2\pi - \gamma, \beta_3' = 1.2\pi - \gamma$, and $\beta_4' = 0.4\pi - \gamma$, where $\beta_1', \beta_2', \beta_3'$, and β_4' represent view angles in a curved plane for corresponding detector rows R1, R2, R3, and R4, respectively, and γ represents a detector angle.

29. (previously presented) A method in accordance with Claim 1 further comprising the step of applying interpolation and extrapolation to determine weights to be applied to the attenuation measurements.

30. (cancelled)

31. (previously presented) A system in accordance with Claim 15 further configured to apply interpolation and extrapolation to determine weights to be applied to the attenuation measurements.

32. (cancelled)